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AMERICAN JOURNAL OF PHARMACY

and

THE SCIENCES SUPPORTING PUBLIC HEALTH

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THE
FIRST BOUND SUPPLEMENT
TO THE
PHARMACOPŒIA
OF THE
UNITED STATES OF AMERICA

TWELFTH REVISION
(FIRST U S P XII BOUND SUPPLEMENT—1943)

BY AUTHORITY OF THE
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Title Page of the First U. S. P. XII Bound Supplement—See p. 176 for review of new drugs made official in this Supplement.

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AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825

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EDITORIAL

WAR-TIME PHARMACY—A RECORD OF ACHIEVEMENT

MANY of those in the field of pharmacy are so intent in fulfilling their duties and obligations that certain aspects of pharmacy are all but overlooked. We in pharmacy for reasons not very well understood have had for years a very decided tendency to underestimate our services in terms of value whereas in most other fields of endeavor no small degree of effort is spent in telling others of their importance.

Self-approbation is indeed not a virtue, but on the other hand neither is a sense of inferiority or even a feeling of mediocrity. Let us examine the record of pharmacy's achievement and accomplishments during this period of war time and consider whether we have reason for disappointment or high satisfaction.

Pharmacy like every other field was, prior to the war, keyed only for peace-time production. With the advent of war demands skyrocketed as they did in every other important field. These have been met and met on time, and yet there has been no serious shortage in civilian supply. The health of the civilian population, so far as drugs are concerned, has been protected and even improved. Some inconveniences have been experienced, it is true, but compare these to other fields: automobiles, rubber, gasoline, refrigerators, paper, food—almost anything else you might mention.

Now there are those who will argue that the drug industry is in a class by itself, that we do not have difficulties with raw materials, plant equipment, changing specifications, etc., etc., but is this the answer? We think not. The entire field of pharmacy has had problems just as pressing and acute as any other industry or profession. We have had headaches, heartaches and backaches. Our success was due to excellent leadership, cooperation and hard work rather than to our task being an easier and less complicated one. We were fortunate in having on the government agencies, which planned our production

and distribution, a number of men who knew the drug industry, its capacities and limitations, and not, as in some other instances, idealists and dreamers.

The manufacturing firms in pharmacy were soundly established and worked in close harmony with both the government and each other. Research activities were directed along lines most urgent in solving the many technical problems that arose, and last but not least the distributive phases of pharmacy have worked doggedly to maintain equitable and satisfactory distribution of a supply which at times was barely adequate. The very fact that only a handful of drugs are restricted as to use and none rationed is evidence of the excellent distribution that has been accomplished.

Pharmacy's record is replete with instances of which we can be justifiably proud: the fact that all army, navy, and lease-lend needs are met and still we have a good civilian supply; the fact that drugs almost unknown before the war, plasma, penicillin, new sulfonamides, are now produced in huge quantities. The story of penicillin itself, from a test-tube experiment to tremendous production in two years, is nothing short of miraculous.

Now that penicillin is available for civilian use, pharmacy is serving as a pioneer in accomplishing the gradual and smooth transition from strict government control to civilian production and distribution through normal trade channels. It may well be that this program, headed by a pharmacist, will become a model for a similar transition by other industries back to civilian production.

The retail pharmacist has "solved" the shortage of trained personnel in most instances not by less service but by the simple, if not easy, expedient of working longer and longer hours. His trials and tribulations, due to shortages, forms, regulations, etc., are matched only by his loyalty and service to the community of which he is a part.

Yes, pharmacy in all its branches has a right and should be proud of its record of achievement! Let us continue to give to our country and its people our best, content with that innermost satisfaction that comes only when a job is well done.

L. F. Tice.

THE NEW DRUGS OF THE FIRST BOUND SUPPLEMENT TO THE U. S. P. XII

By L. F. Tice

In the June, 1942, issue of this journal the author presented a review of the new drugs that were recognized by the U. S. P. XII. It is the purpose of this article to present similar information pertaining to the new drugs of the First Bound Supplement to the U. S. P. XII.

THE First Bound Supplement to the Pharmacopœia of the United States of America, Twelfth Revision, is official as of July 1, 1944. A number of changes in the monographs of the original U. S. P. XII have been introduced and in addition thirty-four new monographs are presented. It is the purpose of this article to describe these new additions and to supply information concerning each which is of value to both pharmacist and physician. The order in which these monographs are presented is so arranged that dosage forms are given under the basic drug where the latter is official in the Supplement.

Capsulae Hexavitaminarum—Hexavitamin Capsules

These capsules contain the six vitamins known to be essential in human nutrition, namely, vitamins A, D, ascorbic acid, thiamine hydrochloride, riboflavin and nicotinamide. Each capsule contains approximately one-half the accepted (National Research Council) minimum daily requirement of each vitamin. They are recognized as a product suitable for use by the physician in those cases where a frank hypovitaminosis is not apparent but wherein an increased vitamin supply is indicated. When vitamins are to be taken simply as a dietary supplement most authorities agree that this type of product containing all the required factors is to be preferred to one which contains only one or two. It is quite likely that an increased supply of one vitamin may increase the body's need for another; and, consequently, in the absence of symptoms indicating a definite deficiency

of some one vitamin or the need of a vitamin for therapeutic purposes single vitamin preparations seem inadvisable.

The Pharmacopœia recognizes now both the old established type of gelatin capsule as well as a new type. This new type instead of having the oil and other ingredients surrounded by a plasticized gelatin shell has the oil emulsified in a gelatin matrix and then the whole surrounded by a gelatin coating. Several products of this type are now available on the market.

Hexavitamin Tablets are also recognized in the Supplement.

Capsulae Totaquinae—Totaquine Capsules

This is simply a recognized dosage form for Totaquine which was made official in the U. S. P. XII. Totaquine is a mixture of the alkaloids obtained from Cinchona and it is used as a substitute for quinine as an antimalarial. The official dose is 0.6 Gm. (10 gr.), but the capsules may be of various sizes.

Capsulae Triasyni B—Triasyn B Capsules

These capsules contain the three synthetic B vitamins known to be essential in human nutrition. The amount of each per capsule is thiamine hydrochloride 1 mg., riboflavin 1.5 mg., and nicotinamide 10 mg. This product is intended for the treatment of multiple B deficiencies since it has been found that, in conditions resulting from the lack of any one of the B group, the administration of all the B factors provides optimum results. Since riboflavin in particular is sensitive to light and thiamine to oxidation, the Pharmacopœia requires that the capsules are to be stored in tight, light-resistant containers.

Tablets of this product are also recognized.

Capsulae Triasyni B cum Hepati—Triasyn B with Liver Capsules

These capsules contain the three synthetic B vitamins as above and in addition 0.5 Gm. of a liver B-vitamins concentrate. Liver contains riboflavin, nicotinamide and other substances, e. g. choline, pantothenic acid and pyridoxine, that are believed to be ancillary in their action. The official recognition of a liver concentrate as a means of supplying these factors was given after such a request by the Surgeon

General of the Army. These capsules are not indicated in the treatment of pernicious anemia.

An injectable form of this product is also recognized under the title *Injectio Triasyni B cum Hepati.*

Concentratum B-Vitaminarum Hepatis—
Liver B-Vitamins Concentrate

This product is the dried aqueous extract of mammalian livers. It is required to contain in each gram not less than 0.2 mg. of riboflavin, 1 mg. of nicotinic acid and 12 mg. of choline. It is a hygroscopic powder varying in color from light tan to dark brown and it has a characteristic liver-like odor and taste. Recognition was given this product as a natural source of the B-complex factors for addition to the synthetic B vitamins in both capsules and an injection as described above. It is not used in the treatment of pernicious anemia.

Dichlorophenarsinae Hydrochloridum—Dichlorophenarsine Hydrochloride

This substance chemically is 3-amino-4-hydroxyphenyl-dichlorarsine hydrochloride, and it is closely related to the well known Parke-Davis product "Mapharsen," now also official under the nonproprietary name of Oxophenarsine Hydrochloride (*q. v.*). It differs from the latter in being its dichloro derivative.

Dichlorophenarsine was introduced by E. R. Squibb & Sons under the name of "Chlorarsen." It is used as an antisyphilitic particularly in early syphilis in which it is both effective and favorable from the standpoint of safety and low toxicity. This drug is packaged in a dry ampul in combination with substances such as sodium carbonate and sodium citrate. Upon solution it liberates 3-amino-4-hydroxyphenyl arsenoxide, and it is therefore quite analogous to Oxophenarsine Hydrochloride since both depend upon the liberation of this arsenoxide for their effect. The dose (intravenous only) of Dichlorophenarsine is 45 mg. (¾gr.), and it is packaged and distributed under regulations issued by the National Institute of Health. Abbott Laboratories also supply this drug under its official title, "Dichlorophenarsine Hydrochloride" and Winthrop under the name "Phenarsine Hydrochloride."

Diethylstilbestrol—Diethylstilbestrol

This substance is chemically 4:4′ dihydroxy-α, α′-diethylstilbene. It is also known as *Stilbestrol.* Diethylstilbestrol is a synthetic estrogen which, although it is not a steroid, has the same qualitative action as the natural estrogens. It is effective when given orally and it therefore differs from most of the estrogens with the exception of estradiol. There is some difference of opinion as to whether it is as desirable a product as the steroid type of estrogen. It is a white, odorless, crystalline powder, almost insoluble in water. The usual mode of administration is in tablet form. The Supplement recognizes *Capsules, Tablets* and an *Injection* (intramuscular) and the official dose is 0.2 mg. (1/300 gr.). Abbott Laboratories supply this product under the name "Stilrone."

Estradiol—Estradiol (alpha-estradiol)

This is a powerful estrogenic substance which chemically is related to estrone. It is believed to be the natural hormone secreted by the ovary, it being subsequently changed into estrone by some oxidative process within the body. Estradiol is effective when administered orally. It is a white or slightly yellow crystalline powder, odorless and stable in air. Its official dose (oral) is 0.2 mg. (1/300 gr.). It is sold by Schering as "Progynon-DH," by Ciba as "Ovocylin" and by Roche as "Dimenformon." The benzoate is given intramuscularly, and recognition was given to it in the original U. S. P. XII.

Injectio Ergonovinae Maleatis—Ergonovine Maleate Injection

Ergonovine Maleate was given recognition in the U. S. P. XII and *Tablets* were also recognized. The injection is now recognized in the Supplement for parenteral use. The dose, either intravenous or intramuscular, is 0.2 mg. (1/300 gr.). It is supplied by Eli Lilly under its official title and by Burroughs Wellcome under the name "Hypoloid Ergometrine."

Injectio Menadioni Sodii Bisulfitis—Menadione Sodium Bisulfite Injection

This is a stabilized and injectable form of Menadione which is one of the synthetic substances that can be utilized by the body as a

vitamin-K. Its administration leads to the formation of prothrombin and it is used in the treatment of hypoprothrombinemias. Menadione and Menadione Tablets were recognized in U. S. P. XII, and now this injectable form is listed in the Supplement. The average dose (parenteral) is 2 mg. (1/30 gr.).

Liquor Hydrogenii Peroxidi Fortior—Stronger Solution of Hydrogen Peroxide

This is an aqueous solution containing in each 100 cc. not less than 7.5 gm. and not more than 8.5 gm. of H_2O_2. It is permitted to contain suitable preservatives. This solution was recognized officially since it was used by the army in the Chemical Warfare Service for the treatment of gas burns. It acted as an oxidizing agent and detoxified certain of the war gases. It has subsequently been replaced by a different compound which is said to be better and also less likely to leak from the container or explode as was the case with the peroxide. In view of this situation there is little need for such a solution as Stronger Solution of Hydrogen Peroxide and it will probably be deleted from the next Pharmacopœia.

Menadioni Sodii Bisulfis—Menadione Sodium Bisulfite

This substance is a compound of menadione and sodium bisulfite, and it is required to contain not less than 49 per cent of menadione. It is a white, crystalline, odorless powder soluble in water, and it must be stored in tight, light-resistant containers. Its official recognition is due to its use in preparing the *Injection,* which see.

Oxophenarsinae Hydrochloridum—Oxophenarsine Hydrochloride

Chemically this is 3-amino-4-hydroxyphenyl-arsineoxide hydrochloride. It is usually distributed as a mixture with buffering agents and other substances to render its solution compatible with blood. Thus the Parke-Davis product "Mapharsen" is supplied mixed with sufficient alkali and sucrose to make its aqueous solution practically neutral and isotonic with blood. "Mapharsen" is the hemialcoholate of this compound, otherwise it is identical with the official substance. "Mapharsen" has received a great deal of favorable reports as an outstanding antisyphilitic probably superior to the Arsphenamines. The

Navy uses it very extensively and it is being employed in some of the newer technics such as massive arsenotherapy with good results. It is also employed in serious cases of Vincent's infection.

The intravenous dose is 45 mg. (¾ gr.). It is packaged and distributed under the regulations governing arsenicals by the National Institute of Health. It should be stored at a temperature not exceeding 20° C. and the expiration date is not more than two years from date of release.

Saccharomyces Siccum—Dried Yeast (Dry Yeast)

This consists of the dried cells of any suitable strain of *Saccharomyces cerevisiae*. It is obtained either as a by-product from the brewing of beer or by growing yeast directly on suitable culture media. The former is known as "Brewer's Dried Yeast" and if debittered as "Debittered Brewer's Dried Yeast." The latter is known as "Primary Dried Yeast." It is required to contain not less than 40 per cent of protein and in each gram the equivalent of not less than 0.12 mg. of thiamine hydrochloride, 0.04 mg. of riboflavin, and 0.25 mg. of nicotinic acid. It consists of yellowish to yellowish orange flakes, granules or powder and it is, since dried, inactive in fermenting power.

Dried yeast is a natural source of all the B-vitamins, as well as a rich source of protein. It has been recommended in a number of clinical conditions, principally those due to an insufficient supply of thiamine and the B-complex factors. In large doses it is slightly laxative. *Tablets* are also recognized officially in the Supplement.

Succinylsulfathiazolum—Succinylsulfathiazole

This substance chemically is sulfathiazole with one of the hydrogens of the $—NH_2$ group replaced with a succinyl radical. It is a white or yellowish white crystalline powder, odorless and stable in air but darkening on exposure to light. One gram is soluble in 4800 cc. of water. The succinyl radical greatly lessens its absorption from the intestinal tract and, consequently, this drug is used to combat certain types of intestinal infections such as bacillary dysentery. Very little of the drug escapes into the blood stream, which is an advantage when the infection is located solely in the intestinal tract. This drug is also useful as a prophylactic agent, given orally, before an abdominal operation involving the intestine such as intestinal resection since it greatly diminishes the danger of peritonitis in the event the peri-

toneal cavity is contaminated during the manipulations. *Tablets* are recognized in the Supplement.

Succinylsulfathiazole is sold by Sharp & Dohme under the trade name "Sulfasuxidine." (The dose is 2 Gm. (30 gr.).

Sulfadiazinum—Sulfadiazine

Sulfadiazine is a sulfonamide drug in which the diazine nucleus is attached to sulfanilamide. Chemically it is 2-sulfanilamidopyrimidine. It is a white or slightly yellow powder, odorless, stable in air, but slowly darkens on exposure to light. One gram of sulfadiazine is soluble in about 13,000 cc. of water but it is somewhat more soluble in blood serum. Sulfadiazine is now used very extensively in treating various coccic infections. It is equal to or better than sulfathiazole in its effectiveness and it is generally considered to be less likely to produce a toxic reaction. Like all of the sulfonamides the ideal method of administering sulfadiazine is to give that dose which will produce an effective blood concentration but not in excess of safe limits, and this can only be determined by repeated blood level determinations during the course of treatment. The effective blood levels for sulfadiazine are from 5-15 mg./100 cc., depending upon the severity of the infection. *Tablets* are also recognized officially and the U. S. P. average dose of Sulfadiazine is 2 Gm. (30 gr.).

Sulfadiazinum Sodicum—Sulfadiazine Sodium. **Sulfadiazinum Sodicum Sterile**—Sterile Sulfadiazine Sodium

The sodium compound of sulfadiazine is much more soluble than the free form. One gram is soluble in about 2 cc. of water at 25° C. The solution is, however, quite alkaline having a pH somewhat above 8.

Sodium sulfadiazine is used locally in solution in various types of therapy such as those for burns, etc., and in sterile form it is used intravenously in those cases requiring immediate use and availability of the drug, e. g., in severe infections such as meningitis, pneumonia, and others. It is also useful in those cases where the patient is unconscious and the intravenous technic is indicated. It should not be allowed to escape extravascularly since it is likely to cause necrosis at the site of injection. The average dose is 2 Gm. (30 gr.)

Sulfaguanidinum—Sulfaguanidine

Sulfaguanidine chemically is sulfanilamide condensed with guanidine. It is a white, needle-like, crystalline powder, odorless, stable in air, but slowly darkens on exposure to light. Sulfaguanidine is soluble to the extent of 1 Gm. in about 1000 cc. of water at 25° C., but it is very poorly absorbed from the intestinal tract. It is in essence quite similar in its uses to succinylsulfathiazole. Very promising reports have been given on its value in treating bacillary dysentery, and in one case at least it was successfully employed in treating a typhoid carrier. The Supplement also recognizes *Tablets* of this drug and the official dose is 2 Gm. (30 gr.).

Sulfathiazolum Sodicum—Sulfathiazole Sodium. **Sulfathiazolum Sodicum Sterile**—Sterile Sulfathiazole Sodium

The sodium compound of sulfathiazole like other sodium compounds is quite soluble in water and it is used in aqueous solution both locally and, when sterile, intravenously. A number of products intended for intranasal use employ this drug, and it has become quite popular. Its effectiveness and field of usefulness are the same as with Sulfathiazole itself which was recognized in the U. S. P. XII. The official dose is 2 Gm. (30 gr.).

Zinci Peroxidum Medicinale—Medicinal Zinc Peroxide

This substance is a mixture of zinc peroxide, zinc oxide, and zinc hydroxide containing not less than 45 per cent of ZnO_2. It is a fine, white or faintly yellow, odorless powder. It is almost insoluble in water, but soluble in dilute mineral acids. Zinc peroxide has received a number of favorable comments in the literature as an antiseptic and deodorant for use in the treatment of suppurating ulcers, diabetic gangrene and neoplastic ulcers. It is of particular value in those cases where anaerobic or microaerophilic organisms are present. It is employed either as a creamy suspension in sterilized distilled water or in some hydrophilic base.

Medicinal Zinc Peroxide must not be confused with various technical grades since there is a great difference in composition. It must be stored in tight containers. Merck & Co. introduced this product under the name "ZPO" which is their proprietary name for the now official substance.

A PHYTOCHEMICAL STUDY OF POTENTILLA ANSERINA AND POTENTILLA ARGENTEA*

By Morris Wolfred, Ph. D.** and Louis Fischer, Ph. D.***

POTENTILLA anserina L., and *Potentilla argentea L.*, members of the *Rosaceae* family, are plants indigenous mainly to the temperate regions of North America, Europe, and Asia. The plants are low, perennial, creeping herbs; their leaves green and silky-tomentose beneath, giving them a silver appearance. *P. anserina* thrives on roadsides, waste and moist places, river banks, lake marshes, and brackish marshes; while *P. argentea* is found abundant on moist and dry plains and in woodland regions. Synonyms for the former are Silver Weed, Wild Tansy, Anserine, and Silberkraut; and for the latter, Wall Cinquefoil, Silvery Cinquefoil, and Silber-Fingerkraut.

Extracts, decoctions, and infusions of Potentilla drugs have been used for centuries in medicine for the treatment of pathological conditions ranging from snake bite, hemorrhage and menorrhagia, to dysentery and enteritis. *P. anserina* is used in Germany for diarrhea, colic, and intestinal cramps.(1)

On the basis of animal experiments, muscular cramps artificially produced by barium were relieved by decoctions of *P. anserina.*(2) In clinical cases Haupstein (3) and Bliss (4) obtained favorable results with the same drug in the treatment of dysmenorrhea. Youngken (5) reported a pharmacognostical and a physiological study of *P. anserina* and *P. argentea.* In view of the fact that so far little information has been reported on their chemical constituents, the present investigation was undertaken.

Experimental

The plant material used in this investigation was obtained during late July, 1941, and identified by Dr. H. W. Youngken, Jr., of the

*Abstract of thesis presented to the Graduate School, University of Washington, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Department of Pharmacognosy, University of Washington. The *P. argentea* was collected in Minneapolis, Minnesota, and the *P. anserina* was gathered near Odessa, Minnesota. The material consisted of the entire plant and was ground to a number twenty powder.

All of the determinations were made in duplicate, the results averaged and reported in percentage based on the air-dried material.

Moisture—The moisture content was determined according to the method of the Association of Official Agricultural Chemists (A. O. A. C.).(6) The results were 8.77 per cent for *P. anserina* and 8.86 per cent for *P. argentea.*

Ash—The total ash, water-soluble ash, and acid-insoluble ash were determined using samples of *P. anserina* and *P. argentea* by the methods described in the A. O. A. C.

	P. anserina Per Cent	*P. argentea* Per Cent
Total Ash	3.09	1.99
Water-soluble Ash	0.50	0.31
Acid-insoluble Ash	2.51	1.47

Extractions—Separate samples of drug were extracted in a Soxhlet apparatus with the following solvents: petroleum ether, ether, chloroform, ethyl acetate, alcohol, and water in order to ascertain the amount and general character of the extractives in *P. anserina* and *P. argentea.* The petroleum ether, ether, chloroform, and ethyl acetate percolates were evaporated spontaneously while the alcohol and water extracts were volatilized on a water bath. The total residues were dried to constant weight over sulfuric acid. The volatile portion of the extractives was determined by heating the total extract to constant weight at 110° C.

	P. anserina Per Cent		*P. argentea* Per Cent	
	Total	*Volatile*	*Total*	*Volatile*
Petroleum Ether	1.07	0.17	1.13	0.22
Ether	3.17	0.35	2.96	0.28
Chloroform	3.32	0.34	3.36	0.22
Ethyl Acetate	4.76	0.63	4.51	0.49
Alcohol	20.28	...	14.91	...
Water	22.41	...	22.23	...

Proximate Analysis—Reducing sugars, sucrose, starch, pentosans, protein, tannin, and crude fiber were all determined quantitatively according to the A. O. A. C. procedures. The results are presented in tabular form.

	P. anserina Per Cent	*P. argentea* Per Cent
Reducing Sugars	2.79	3.44
Sucrose	1.20	1.57
Starch	3.30	3.79
Pentosans	8.34	13.90
Protein	6.19	9.00
Tannin	10.76	3.10
Crude Fiber	15.42	18.08

Alkaloids—Fifty grams of each drug were refluxed with alcohol containing sufficient tartaric acid to make the liquid slightly acid to litmus. The material was filtered and the alcohol removed from the filtrate by evaporation. The residue was treated with water, filtered, and tested with the usual alkaloidal reagents for the presence of alkaloids by placing a drop each of the unknown solution and the reagent on a slide and examining under a microscope. All tests were negative.

Glycosides—A similar portion of the acidic liquid used in testing the presence of alkaloids and which represented 50 grams of the original drug was extracted with ether.(7) After drying the ether shakings with anhydrous sodium sulfate, the extract was concentrated to a small volume and the residue set aside to crystallize. No crystalline material was observed on long standing. A portion of the residue was then taken up with dilute alcohol and tested by the Molisch reaction. Positive reactions were obtained for *P. anserina* as well as *P. argentea*. Another part of the dilute alcoholic solution was heated with a few drops of hydrochloric acid and after neutralizing with sodium hydroxide, the solution was tested for the presence of reducing sugars. *P. anserina* and *P. argentea* both gave positive results by the reduction of Fehling's solution.

The Bourquelot method (8) using yeast and emulsin gave indications of the presence of a glycoside.

Tests for cyanogenetic glycosides by methods suggested by Morrow,(9) using sodium picrate paper and the benzidine-copper acetate paper test, gave negative results.

Tormentol—Two methods were used for the isolation of tormentol. The first procedure was similar to the one used by Goris and Vischniac (10) in the isolation of tormentol from Tormentilla roots. The second method was adopted from Gillot and Wioland (11) involving the use of alcohol as a solvent. The crystals of tormentol were recrystallized from 60 per cent alcohol. Tormentol was found to be present in *P. anserina* as well as *P. argentea;* the yields were 0.12 and 0.08 per cent respectively.

Tormentol was obtained in needle-like crystals, melting between 225-226° C.; they were soluble in ethanol, methanol, acetone and concentrated acetic acid; insoluble in water, ether, and chloroform. The substance gave the same color reactions as reported by Gillot and Wioland (11) for tormentol isolated from *P. tormentilla* and *P. reptans.* Attempts to prepare urethane derivatives of this compound with phenyl isocyanate and alpha-naphthyl isocyanate yielded negative results.(12)

Investigation of Tannin—A sample of tannin was obtained by exhausting separately *P. anserina* and *P. argentea* with alcohol, concentrating the extract under reduced pressure, and precipitating the tannin with lead subacetate. The lead tannate was washed thoroughly with water by decantation, decomposed with hydrogen sulfide, filtered, and the filtrate extracted with ether. The aqueous solution was then evaporated under reduced pressure to a thick syrup and the remaining water removed by means of a vacuum oven.

The tannins were treated by three different processes and several components were identified by appropriate qualitative tests.(13) A sample of tannin from each drug was decomposed by heating with glycerin in a pyrex test tube to a temperature of 190-200° C. for 20 minutes. Both pyrogallol and catchol were identified as decomposition products.

Another portion of the tannin from each drug was subjected to the action of dilute hydrochloric acid at 100° C. for several hours in a sealed flask. Gallic acid, ellagic acid, glucose, and a phlobaphene were found present in the hydrolytic mixture.

A third sample of tannin from both drugs was fused with potassium hydroxide in a crucible. Tests for protocatechuic acid and phloroglucinol were obtained in the fusion mixture.

Phlobaphene—A red phlobaphene was obtained from *P. anserina* and *P. argentea* by extraction with 1:1000 solution of sodium hydroxide.(14) The extract was purified by repeated extraction with chloroform and ether, and the phlobaphene precipitated by the addition of dilute hydrochloric acid. The material was then washed free from acid and other soluble foreign matter with water, dried in a vacuum oven below 70° C., and finally over sulfuric acid until the weight became constant. On combustion the following results, expressed in per cent, were obtained for the purified phlobaphene.

	Carbon	*Hydrogen*
P. anserina	60.01	4.99
P. argentea	60.80	5.09

Summary

1. The per cent of moisture, ash, reducing sugars, sucrose, starch, pentosans, protein, tannin, and crude fiber was determined in *P. anserina* and *P. argentea*. The amount of extractives obtained by various solvents from each drug was also ascertained.

2. The test for alkaloids was negative in both drugs.

3. Examination for the presence of glycosides failed to yield them in crystalline form; however, there are indications of their presence in the two species.

4. Tormentol was isolated from both *P. anserina* and *P. argentea;* the yields were 0.12 and 0.08 per cent respectively. Attempts to make urethane derivatives of this compound gave negative results.

5. The tannins found in *P. anserina* and *P. argentea* were found to be of a mixed type as they yielded on heat decomposition pyrogallol and catechol; on acid hydrolysis gallic acid, ellagic acid, glucose, and a red phlobaphene; alkali fusion, protocatechuic acid and phloroglucinol.

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A METHOD OF PREPARING ALBARGIN *

By M. G. Volpe

THIS work is divided into two stages:

1. The preparation of gelatose.
2. The preparation of gelatose—silver.

1. The Manufacture of Gelatose

Forty (40) parts of food gelatin are soaked with one hundred twenty (120) to one hundred fifty (150) parts of distilled water in such a manner that all the gelatin is completely moistened, then heated on a water bath until the gelatin is entirely dissolved. The liquid is cooled until a solidified gelatin mass results. This resulting product is then ground in a meat grinder.

The resulting granulation is washed with distilled water until the washings cease to give a reaction for chlorides.

Upon completion of the washing, the gelatinous jelly is lightly expressed to expel its water content and placed in an autoclave. It is heated in the autoclave at two and one-half (2.5) to three (3.0) atmospheres of pressure until such time that a test sample, which is placed in crushed ice, ceases to form a jelly.

In laboratory experiments this operation continued about three and one-half (3½) hours.

The gelatose solution obtained in this manner is filtered and evaporated to one hundred (100) to one hundred twenty (120) parts. This produces a brownish-red liquid. To decolorize it the liquid is allowed to cool, a solution of three (3) to four (4) parts of three per cent (3%) hydrogen peroxide solution diluted with eight (8) to ten (10) parts of water is added, and the solution is mixed and again heated until one hundred (100) parts of a syrupy-like liquid are obtained. This syrupy liquid is separately tested for its dry residue.

The yield is twenty-five (25) to thirty (30) parts of dry residue.

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*Translated by Edgard Yan Allen, M. Sc., from the Russian article bearing the same title (in Russian) and contained in the Soviet Russian publication "Endeavors of the Leningrad Institute of Experimental Pharmaceutical Knowledge," Volume III, 1940.

2. The Manufacture of Gelatose—Silver**

From the resulting gelatose solution, a quantity corresponding to seventy-seven (77) parts of dry gelatose is taken. To this are added twenty-three (23) parts of a fifty per cent (50%) solution of silver nitrate.

After all of the silver nitrate has combined with the gelatose, the liquid is placed into a wooden vessel, which has a capacity of from ten (10) to fifteen (15) times greater than the volume of the liquid, and, with the aid of a rapidly rotating stirrer, is changed into a stiff foam.

The resulting foamy mass is spread on glass in a layer of one and one-half (1.5) to two (2.0) centimeters in thickness and dried in the air at forty-five degrees (45°) to fifty degrees (50°) Centigrade.

The completion of drying is determined by the appearance of cracks on the surface of the mass.

The dried product is easily scraped off with a spatula or knife. It is changed into powder by grinding in a ball mill.

If a product containing a greater amount of silver than fifteen per cent (15%) is obtained, it is diluted with a corresponding product containing a smaller amount of silver to the required percentage of silver, based on calculations for one kilogram (1 Kg.) of Albargin.

Quantities of Materials Required to Produce One Kilogram of Albargin

Gelatin .....1200.0-1500.0 Gm.
Hydrogen Peroxide 3% .....100-150 ml.
Silver Nitrate .....250.0 Gm.

Utensils Required for Manufacturing

1. Tank for boiling gelatin (tinned copper).
2. Meat grinder.
3. Tank for washing the gelatinous jelly (tinned copper or wooden).
4. Autoclave capable of withstanding up to five (5) atmospheres of pressure.
5. Drying oven with a temperature regulator and having either glass or porcelain trays.
6. Porcelain ball mill.

**This method was given to the "Pharmakon Factory" in 1930.

SCIENCE AND FREEDOM

By T. Swann Harding

A few issues past, Mr. Harding set forth his contention that scientific research could be planned without regimenting scientists. In this issue he presents certain views to the effect that the freedom and creative abilities of the scientists are not of necessity a corollary of free enterprise and that an equal or even greater degree of freedom is possible under government planning and control. This is a debatable point but our readers will, at least, be interested in the arguments advanced either to endorse them or mentally to rebut them.

THERE is a considerable din in the world about freedom these days—but too little thought about freedom *from what* and *to do what*. Naturally the clatter has reached the silent precincts of the men of Measured Merriment. You can hardly pick up a scientific publication without finding someone ranting about the necessity for protecting research workers from regimentation and giving them freedom.

Not long since it was the President of Harvard saying that the scholar and scientist must be free both from intimidation and from control by government. He must inquire and speculate with as few restraints as possible. The implications of these Jeremiads always run to the effect that Government interference spells disaster.

Many seem to feel that even a modicum of planning and organization in the effort to produce the highest social efficiency of scientific knowledge would undermine research, result in the regimentation of scientists, and, worst of all, destroy the profit system which, it is said, alone makes research possible. Well does it?

We might set in opposition to this dolorous thesis some words recently uttered by Prof. L. C. Dunn of Columbia University. He was discussing science in Russia where, being totally under state domination, it would supposedly have undergone destruction. He said—

"The progress of biological research in the Soviet Union has taught us a very valuable lesson. It is that control and organization

of science by and for the whole community does not kill the scientific spirit or initiative nor submerge the individual scientist in a dead level of anonymity. Great individuals have arisen in Soviet biology, fine discoveries have been made and continue to be made, even in the midst of war."

Dunn then concluded that "a vital and a vigorous science could survive in a socialist state," where it obviously has been regimented and also deflected from its path now and then by purely political and ideological considerations,—no doubt about it. Obviously scientific progress depends less upon the profit motive than some of us imagine and it is also more difficult to kill research than others believe.

It would not be surprising if we find eventually that even some German research workers have managed to make notable discoveries in the field of pure science, secretly of course, right under the Nazi heel. It is certainly incontrovertible that Russian scientists have done outstanding work under the closely organized Soviet regime, where it is all but impossible for them to cash in on their findings as they could under a profit system.

Merely to say that scientists and scholars should be free is to say nothing, for no member of any human society can possibly have absolute freedom. To imply that the most pernicious form of interference with the scientist's work is governmental in origin is to distill moonshine. This may or may not be the case.

It is perfectly true that, on occasion, investigations carried on by government scientists have met interference or even annihilation. Sometimes this has been accomplished by legislative action; sometimes by the edict of timid supervisors in the face of adverse criticism or open hostility on the part of outside individuals or organizations. Under these circumstances the scientist certainly was not free to pursue his natural bent.

But the most notable interferences of this sort come from outside, not inside, the Government. They arise from no purely internal weakness of governmental research. They represent the meddling of outsiders, usually people in private business or some other form of private activity who can exert sufficient pressure upon legislators and politicians to have their way. But the same sort of people are as ready to interfere with private scientific work insofar as they can.

For it is just as true that elaborate and promising investigations carried on by scientists in private industries have often ended abruptly

because they did not meet with the approval of some shareholder or high company official. Perhaps the official saw no profit in that line of research, or felt that workers in private enterprise should not do pure research anyway, or simply did not like the scientist in charge but could not replace him. That happens too. It also constitutes interference with science.

A great many even take the position that the wartime coordination of scientific work accomplished under the Office of Scientific Research and Development, and by other agencies, is bad and must end with the war. Yet American science has never operated more efficiently than it does today and the outstanding research accomplishments of the Department of Agriculture have been achieved in full compatibility with planning, supervision, and organization.

To hold that scientists and scholars are free simply because they are not subjected to government interference is fallacy. If wholly outside government, they are still regimented in many ways—by their wives and families, by their financial obligations, by the time their commuter train leaves the suburban station, each day, by the whims of their bosses, and by the policies evolved by their superiors.

Here, for instance, is a rather distinguished scientific worker in charge of a considerable laboratory, but he lacks the temperament that makes a good leader or supervisor and he has endless minor whims. Thus he believes that no research worker should have a desk because that makes him lazy; he can have only a table. He must not crystallize anything in a crystallizing dish because a beaker is better. He should have no telephone and only a stool to sit upon, never a chair.

Men like that are nuisances and brakes on the wheels of progress, no matter where they work. It is the petty tyrannies of such individuals, and they are legion, which tend to prevent subordinates from being free. To work under them in a private industrial laboratory produces no more freedom from regimentation than to work for them under government.

Possibly if most research workers and scholars were interviewed, it would develop that the freedom they relish most is financial freedom. They would like to feel that they had attained economic security. Generally they have prided themselves upon being disinterested in broad social and political questions, so much so that they have been easily imposed upon by cheap demagogues and shysters.

Actually they rarely indeed want to say anything they cannot say and very often they take little interest in having their say or in voting. It is characteristic of many of them to evade responsibility, even if this means failure to be promoted; they would in most instances rather be subordinate workers. Still more rarely is their scientific initiative thwarted in any laboratory; much more frequently they are merely prevented from acting like fools or from going off half-cocked.

Very possibly a nation which actually provided economic security for its scientists, after ascertaining they had the training and ability to be useful laboratory workers, would provide them with more freedom than one which enabled them to choose freely among a hundred dentifrices, fifty breakfast foods, and several machine-nominated and not very promising candidates for public office. Possibly it is easier to work for the government under an enlightened supervisor than to work for private enterprise under a little dictator.

In our society intimidation comes much more rarely from government than from individuals. Government control may or may not mean interference with free initiative in the laboratory and, in most instances, it certainly does not. It is even possible for great scientists to arise and do great work under systems of government control which seem to us intolerable.

It would be well for those who insist that science and scientists must be free from intimidation, interference, regimentation, and the other evils they associate with government control, would define their terms. It would be well for them to consider what laboratory work in private industry implies. It would be well for them to remember that perfect freedom is a chimera and that no one can form part of any organized society and expect a total lack of interference. That just doesn't happen anywhere.

SELECTED ABSTRACTS

Some Aspects of the Chemistry of Antioxidants. F. Bergel. *Chem. and Ind. No. 14,* 127 (1944). Antioxidants for foodstuffs must be non-toxic, palatable, readily dispersible, and relatively cheap in manufacture. The existing theories of the mechanism of the antioxidant action do not completely explain all of the results noted; among these are the peroxide theory, the chain reaction theory, and the theory of deactivation of autoxidation catalysts.

For the preservation of food the compounds most useful as antioxidants are those rich in hydroxy groups, especially of phenolic or enolic character. The author classifies them by groups as follows:

Quinol group. The hydroxychromans, tocopherols, and 5-hydroxycoumarans belong to the large group of phenolic antioxidants, but they also are derivatives of quinol. Some of the inhibitols occurring in vegetable oils are similar to or identical with the tocopherols. Other inhibitols are quinones derived from the 5:6-dihydroxychromans, and are somewhat labile to alkali. The coumarones and isocoumaranones are also effective stabilizers, but the coumarins and coumaranones are inactive. The addition of citric or ascorbic acid is said to enhance the antioxygenic activity of the whole group. Pentamethyl-6-hydroxychroman has been found most active for carotene in solution.

Pyrogallol group. The lower homologues of the alkyl gallates have been extensively investigated. The amyl ester, particularly, appears promising for the protection of vitamin A. The ethyl ester, however, has the drawback of possessing limited solubility in fats. It would appear that the higher homologues, *e. g.,* lauryl or palmityl gallate, would be desirable; but the preparation of these compounds by esterification of the corresponding alcohols is not possible by ordinary means. Esters of syringic acid, the corresponding dimethoxygallic acid, have been prepared; possibly these may be an improve-

ment. Combinations with coniferyl alcohol and vanillin derivatives have also been described. It is of interest to note that the antioxidant property of Siam benzoin is said to reside in coniferyl benzoate.

Dienols. As a group the dienols, such as ascorbic acid, are water-soluble. Ascorbic acid acts as an inhibitor for certain vegetable oils, increasingly so in the presence of the tocopherols or other hydroxychromans. It has been reported that ascorbic acid is able to delay enzymic oxidation of linoleic acid. To a large degree its antioxidant properties are independent of optically (*d*-ascorbic acid) or sterically (iso-ascorbic acid) different forms. This fact is of economic interest, since it has been found that 2-ketogluconic acid, used as an intermediate in the synthesis of iso-ascorbic acid, can be produced in 70 to 90 per cent yield from glucose by the action of various *Pseudomonas* species.

A synergistic effect is achieved by mixing hydroxychromans or other polyphenols with ascorbic acid. Such acids as maleic, oxalic, citric, tartaric, and phosphoric show the same effect, though their neutral esters do not. Their antioxidant effect appears to be due to the fact that they bind and remove the last traces of metals, particularly copper.

ω-Hydroxy-hydroxyacetophenones. It was hoped that such compounds might combine the features of the polyphenols and to a certain extent of the dienols, but the results observed failed to bear this out. Free ω-hydroxy-3:4:5-trihydroxyacetophenone had not been prepared previously. The compound was more readily subject to autoxidation than pyrogallol, especially under slightly alkaline conditions.

Nitrogen-containing antioxidants. Alkanolamine esters of the formula $RO.OC.CH_2.NR'R''$ and various aromatic amines have been used as inhibitors in oils. Casein and edestin are good stabilizers for vitamin C. It has been claimed that purines such as uric acid and xanthine possess antioxidant properties. Kephalin has been stated to be the active principle in crude lecithin. Oatmeal extracts seem to contain active phospholipins or protein-fat complexes. Hilditch and his collaborators have investigated natural inhibitors of a basic nature present in vegetable seed oils. Adrenalin shows activity which surpasses that of pyrocatechol.

Ephedrine and Argyrol in Saline. E. W. Barstow and T. D. Whittet. *Pharm. J. 98,* 121 (1944). Because of comment in the medical literature regarding the incompatibility of ephedrine hydrochloride and Argyrol (Barnes) in physiological saline solution, the authors prepared such solutions in several ways and compared them.

A solution prepared by dissolving Argyrol in half the distilled water required, and the sodium chloride and ephedrine hydrochloride in another portion, mixing and diluting to volume, yielded no immediate precipitate. Even after six weeks there was only a slight precipitate, and the solution remained bright and clear. Similar results were obtained through the use of mild silver proteinate B. P. C.

Other procedures tried were: (1) the silver compound was dissolved in the required amount of distilled water, after which the ephedrine hydrochloride and sodium chloride were dissolved in the solution; and (2) the ingredients were placed together in a graduate, dissolved in a small quantity of water, and diluted to volume.

Even under these adverse conditions no precipitate appeared, and the solutions remained clear after six weeks' storage. Clinical tests of these solutions failed to reveal the congestion or encrustation of the nose which had been previously noted by another observer as a result of the use of such a combination which had yielded a precipitate immediately after its preparation.

Cascara Sagrada, Its Extracts and Extractives. A. Firth. *Pharm. J. 98,* 130 (1944). Percolation studies on cascara sagrada were carried out with (1) cold water, according to the B. P. 1932, and (2) boiling water, as specified by the B. P. Sixth Addendum. It was found that twice the volume of cold water percolate was required to obtain the same proportion of extractive as that yielded by the boiling water method. The marcs were dried and exhausted with 95 per cent alcohol in a soxhlet apparatus. In both cases the total extractive was nearly 36 per cent.

Comparison was made of the relative solubilities in cold water and in alcohol of various strengths of the following dry extracts: two B. P. 1932 samples, two U. S. P. samples, and four extracts specially prepared from bark (1) by cold water extraction, (2) according to

the Sixth Addendum, (3) by soxhlet extraction with 95 per cent alcohol, and (4) by repeated decoction. The results suggested that there is a portion of extractive common both to water and 90 per cent alcohol. The author recommends as a means of standardization the establishment of suitable limits of water-insoluble extractive, and extractive soluble in 90 per cent alcohol.

Propylene Glycol: a Solvent of Active Principles. J. Rae. *Pharm. J. 98,* 122 (1944). In order to compare the respective solvent properties of propylene glycol and alcohol upon vegetable drugs the author selected rhubarb (20 sieve), catechu (20 sieve), senega (40 sieve), balsam of tolu (coarsely powdered), and powdered opium B. P. for this series of experiments. The drugs were placed in wide mouth, stoppered bottles, macerated with the solvent for seven days with occasional shaking, and then filtered. The propylene glycol was diluted with distilled water to correspond with the percentage strength of the alcohol used in each pair of extractions.

Rhubarb. Ten gm. of drug were extracted with 90 mils of solvent of 60 per cent strength. One mil of each of the filtered products was tested for anthraquinone derivatives by Fairburn's method. The propylene glycol preparation gave twice the color of the alcoholic tincture.

Catechu. Twenty gm. of drug were extracted with 100 mils of 45 per cent solvent. A one-mil sample of each product was tested for tannin by a method previously described by the author; the colors obtained matched exactly.

Senega. Twenty gm. of drug were extracted with 100 mils of 60 per cent solvent. One-mil samples of each, when tested by the author's colorimetric method, yielded identical colors. Both phenols and saponins react in this test, but it has not been shown that the test estimates all of the active constituents of senega.

Balsam of Tolu. Ten gm. of drug were extracted with 100 mils of 90 per cent alcohol or 100 per cent propylene glycol. The latter

solvent failed to dissolve all of the drug; on the other hand, alcohol dissolved it completely within twelve hours. Five mils of each product were added to 50 mils of alcohol, neutralized to phenolphthalein, and titrated with N/10 NaOH. Alcohol proved a better solvent than propylene glycol for the acidic constituents, since 9.3 mils of standard alkali were required for the former and only 7.8 mils for the latter.

Opium. Ten gm. of drug were extracted with 90 mils of 45 per cent solvent. The morphine content of the two products was determined by the B. P. method: the alcoholic tincture contained 0.992 per cent; the propylene glycol preparation, 0.960 per cent.

All of the propylene glycol preparations remained clear and free from deposit for two months, except in the case of the balsam of tolu, which became cloudy within twelve hours after filtering.

Modern Treatment of Burns: Revised E. M. S. Recommendations. (Editor.) *Pharm. J. 98,* 92 (1944). Increased experience in the treatment of burns has necessitated the revision of the Memorandum issued in 1942 by the Department of Health for Scotland.

Tannic Acid. The use of this substance as a coagulant is no longer recommended, since it has been shown that when it is applied to a large burned area it can be absorbed in quantities sufficient to cause general poisoning or even necrosis of the liver.

Sulfonamides. Large burns should not be dusted with a sulfonamide powder nor treated with emulsions or creams containing more than 1 per cent of the drug. Smaller burns should receive no more than 10 gm. of a sulfonamide powder at one application, and emulsions or creams should be of a maximum strength of 3 per cent for this purpose. Local applications of a sulfonamide should not be repeated more often than once in four days nor continued for a period longer than two weeks.

A formula recommended for a 1 per cent sulfanilamide emulsion contains 25 per cent of castor oil in water, with Lanette wax SX as the emulsifying agent. The preparation should be sterilized in an autoclave and re-emulsified by shaking.

Propamidine. This substance should be used only for burns of small extent, and in a concentration of 0.1 per cent in an ointment or jelly base, owing to its necrotic action on living tissue.

Dyes. Poisoning by absorption of dyes is possible if they are applied to large burns and in concentrations higher than 0.5 per cent. Proflavine is the least poisonous, and is probably always safe when used in 0.1 per cent strength.

A formula recommended for triple dye therapy consists of equal parts of aqueous solutions containing crystal violet 0.5 per cent, brilliant green 0.1 per cent. and proflavine or euflavine 0.1 per cent. For use as a coagulating solution, crystal violet or euflavine may be used in the respective strengths previously stated.

Silver Nitrate. A strength of 5 or 10 per cent is recommended as a coagulating solution. It seems unlikely that its application to a burn will cause poisoning by absorption, since experimentation on animals has demonstrated that relatively large quantities can be injected without producing general poisoning.

Penicillin. This appears to be an ideal bacteriostatic agent of low toxicity for local use in the treatment of burns. As yet, however, supplies are not available for general use.

BOOK REVIEWS

The Chemistry of Organic Medicinal Products. By Glenn L. Jenkins, Dean and Professor of Pharmaceutical Chemistry, School of Pharmacy, Purdue University; and Walter H. Hartung, Professor of Pharmaceutical Chemistry, School of Pharmacy, The University of Maryland. Second Edition. John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd., London. December, 1943. 675 pp., 5½ x 8 in. Price: $6.50.

This book is a revision of the first planographed edition of 1941. It appears in regular print and is bound in cloth. The compilation is intended primarily for use by students in the more advanced courses in pharmaceutical, chemical, biological, and medical sciences. The large number of organic medicinal compounds is organized according to the accepted scheme of chemical classification. Although in each chapter the essential organic reactions are fully explained, the knowledge of the basic principles of organic chemistry is almost a prerequisite to derive a benefit from studying this book. The uses and modes of administration of the medicinal compounds are given and, whenever feasible, the correlation between chemical structure and physiological activity is discussed. A new chapter in the second edition is entitled "Some Physicochemical Properties of Medicinal Products."

Of great value are the references to recent original literature at the foot of each page. In addition, more general references are found at the end of each chapter. The latter cover pertinent review articles as published in books or journals. An ample general bibliography is also presented at the end of the book, covering: General Chemical Literature, Organic Medicinal Products, Chemotherapy, Phytochemistry, Alkaloids, Vitamins, Enzymes, Pharmacology and Therapeutics, Special Subjects. The reader is thus greatly aided in securing more elaborate information on any one subject.

"The Chemistry of Organic Medicinal Products" is a commendable achievement. It deserves a favorite place on the book shelf of any pharmaceutical chemist, academic and industrial alike.

MAXIMILIAN EHRENSTEIN.

The Drug and Cosmetic Industry. A Vocational Monograph. By Clare Olin Ewing, M. S. The Bellman Publishing Co., Inc., 6 Park Street, Boston, Mass. Price: 50 cents.

Of the forty-eight vocational and professional monographs offered by this publisher, one deals with the drug and cosmetic industry. Its author was educated in pharmacy and is now associated with a large drug company. He treats very well the distinction between "retail" or practicing pharmacy and the manufacturing phases of the profession.

Various sections of the 24-page booklet give concise information on the magnitude of the industry, its history, and its subdivisions. The general qualifications required of employees and the various divisions of personnel are discussed. Requirements and costs of education and the scope of college studies are outlined. The advantages of work in the field are weighed against the disadvantages.

As a basic reference work for the guidance of those who are contemplating entrance into the drug and cosmetic industry, the brochure is adequate. A lengthy bibliography will enable the interested person to make further references.

JOHN E. KRAMER.

The American Illustrated Medical Dictionary. A complete dictionary of the terms used in medicine, surgery, dentistry, pharmacy, chemistry, nursing, etc., with pronunciation, derivation and definition. By W. A. Newman Dorland, A. M., M. D., F. A. C. S., with the collaboration of E. C. L. Miller, M. D. 20th edition, 1668 pages, 885 illustrations. Flexible and stiff binding. W. B. Saunders Co., Philadelphia and London, 1944. Price: Plain, $7.00; thumb-indexed, $7.50.

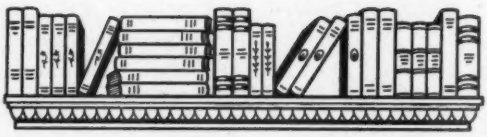
During the three years which have passed since the nineteenth edition of this standard work appeared, notable advances have been made in the fields of chemotherapy, endocrinology, vitamin research, tropical and parasitic diseases, mycology, and other branches of medicine. The additions to the medical vocabulary which have thereby

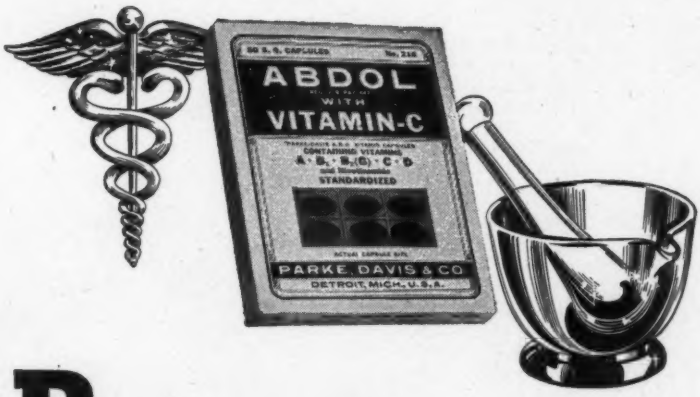
resulted have been covered in the present edition, as well as the terminology of war medicine and surgery; to include the new material it was necessary to enlarge the book beyond the 1647 pages of the nineteenth edition.

The terminology used in this edition is that advocated by the "Standard Nomenclature of Diseases and Operations," published by the American Medical Association. Space does not permit the mention of all the individuals or groups who furnished material for this revision, but special recognition is due the members of the staff of the Library of the New York Academy of Medicine who contributed scores of new words never before defined in a dictionary.

The student or practitioner in the various fields covered will find this comprehensive work indispensable as a reference.

A. A. Dodge.





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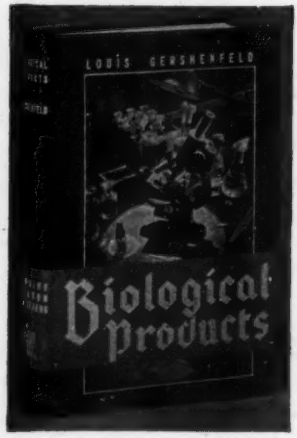

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